

High Reliability Oscillators for Terahertz Systems, Phase I

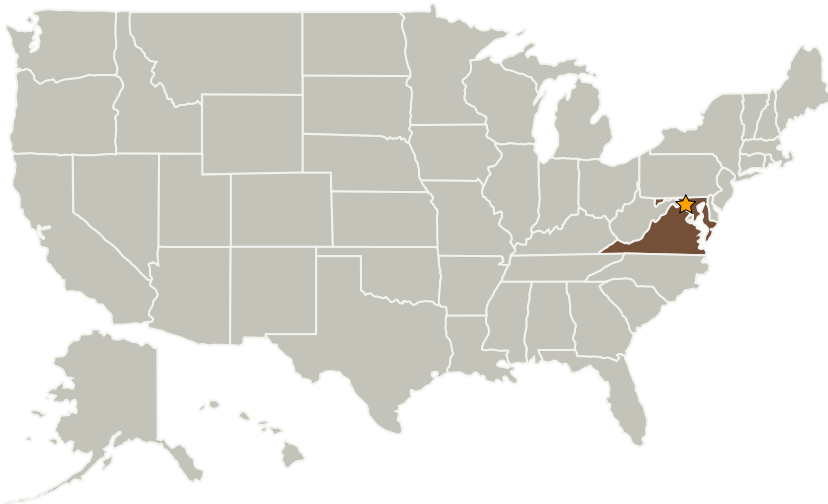
Completed Technology Project (2006 - 2006)



Project Introduction

Terahertz sources based on lower frequency oscillators and amplifiers plus a chain of frequency multipliers are the workhorse technology for NASA's terahertz missions. The design and optimization of individual multipliers is fairly well understood. However, the complex interactions within a chain of nonlinear multipliers often limit the system performance. Specific manifestations of these interactions include rapid variations in power as the frequency or input power are tuned, including nulls and power surges that can damage individual components. These effects limit the useful bandwidth of terahertz sources, degrade system reliability and greatly increase the time and cost of developing systems for a particular application. Today, these problems are mitigated through the use of mechanical tuning or bias adjustments at each frequency, the laborious tweaking of each component in the chain until acceptable system performance is achieved, or reduction of the system bandwidth and/or power specifications. This proposal concerns the first systematic study of the complex interactions between cascaded nonlinear multiplier stages, with the goal of developing new multiplier and system designs that reduce these unwanted effects. The resulting terahertz sources will achieve greater efficiency, bandwidth, reliability and ease-of-use, as well as shortened system design cycles and greatly enhanced manufacturability.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission
Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center
(GSFC)

Responsible Program:

Small Business Innovation
Research/Small Business Tech
Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Virginia Diodes, Inc.	Supporting Organization	Industry	Charlottesville, Virginia

Primary U.S. Work Locations

Maryland	Virginia
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
 - └ TX05.4 Network Provided Position, Navigation, and Timing
 - └ TX05.4.1 Timekeeping and Time Distribution